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**First name and last name**

Fill out with capital letters

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**Student number**

Writing time: 75 minutes, date: December 17, 2018

Comments: in case of all programs assume that libraries iostream and stdlib are attached and the namespace std is available. Only places marked for the answers are graded. In case you find a mistake or ambiguity in a question, please write an appropriate comment which explains that. The number of marks for the test is 0-100 points (passing threshold = 50%).

**Question 1. (20 pts. = 5\*4 pts.)**

Selected fields fill out so that the program compiles correctly and prints out to the screen:

**6284**

When giving you answer:

- 1) you can use only variable names, digits, ",", and operators,
- 2) write ERROR if there is no solution.

```
int next( int *t, int n, int j ) {  
    for ( ; j >= 0; j-- )  
        if ( ! (t[j] % 2) )  
            break;  
    return j;  
}  
int main() {  
    int x[] = {4,8,3,7,2,1,9,5,6}, z =      8    ;  
  
    while (      z >= 0      ) {  
  
        z = next(      x, 9, z      ) - 1;  
        cout << x[z+1];  
    }  
    return 0;  
}
```

**Question 2. (20 pts. = 4\*5 pts.)**

What are the contents of array a right before the end of the execution of function *main*.

Answer:

a[0][0] = **2**

a[0][1] = **0**

a[1][0] = **0**

a[1][1] = **0**

```
int a[2][2];  
int g( int x[2], int i, int j ) {  
    x[0] = (i+3) % 4;  
    if ( i <= j )  
        if ( g( x, j, i ) <= j )  
            x[1] = i + (j++);  
    return x[1];  
}  
void h( void ) {  
    a[1][0] = g( a[0], 2, 3 );  
    a[0][1] = g( a[1], 5, 2 );  
}  
int main() {  
    h();  
    return 0;  
}
```

**Question 3. (19 pts.)** What will be written to the screen as a result of the execution of the following program?

Answer: **3**

```
int *reall( int *s, int h ) {  
    int i, *n = (int *) malloc( h * sizeof(int) );  
    n[0] = n[h-1] = 1;  
    for ( i=1; i < h-1; i++ )  
        n[i] = s[i] + s[i-1];  
    if ( s != NULL ) free( s );  
    return n;  
}  
int main() {  
    int z[] = {1,0,1,0,1,0}, i, j, *b = NULL;  
    for ( i=j=0; i < 6; i++ ) {  
        j += z[i];  
        b = reall( b, j );  
    }  
    cout << b[j-2];  
    free( b ); return 0;  
}
```

**Question 4. (21 pts. = 7\*3 pts.)** Give the text which is written to the screen as a result of executing subsequent instructions *cout* (in place for an answer marked with label "Instruction x" write the test that is printed to the screen by instruction *cout* marked with comment */\* I-x \*/*. Write *ERR* if the answer cannot be uniquely determined. Binary encoding of number is assumed to be as presented during the lectures, i.e., U2. If some instruction results in writing outside an array or some other execution error, then also write *ERR* as an answer and continue your analysis by skipping this instruction.

```
int x;
int main() {
    int tab[3] = {0,1,2};
    int *x = tab;
    unsigned int u = 0;

    cout << sizeof( tab ); /* I-1 */
    cout << sizeof( x ) / sizeof( int ); /* I-2 */
    cout << (27 ^ 11); /* I-3 */
    cout << *(x+1)-1; /* I-4 */
    cout << ( *(++x) == tab[1] ? 1:0 ); /* I-5 */
    cout << (u+1)-x[1]; /* I-6 */
    cout << &(tab[1]) - tab; /* I-7 */
    return 0;
}
```

Answers:

Instruction 1: **ERR**

Instruction 2: **ERR**

Instruction 3: **16**

Instruction 4: **0**

Instruction 5: **1**

Instruction 6: **ERR**

Instruction 7: **1**

**Question 5. (20 pts. = 4\*5 pts.)**

Fill out the field so that the program compiles successfully and executes without errors. The program has been executed in command line as follows:

prog.exe 3 ab c 117

where prog.exe is the name of the program after compilation. What will be printed to the screen?

```
int check( const char *s ) {
    return ( s[1] == '\0' );
}

int main( int argc, char *argv[] ) {
    while ( --argc >= 0 )
        if ( check( argv[argc] ) )
            cout << argv[argc][0];
    return 0;
}
```

Answer: **c3**